Claims

1. A method for selecting the emission wavelength of a tuneable laser having an external-cavity defining a plurality of cavity modes, wherein selecting occurs by means of a tuneable mirror that comprises a diffraction grating and a planar waveguide optically interacting with said diffraction grating, the diffraction grating and the planar waveguide forming a resonant structure, the tuneable mirror further comprising a light transmissive material having an index of refraction that varies in response to an electric field applied to the light transmissive material, making the tuneable mirror electrically tuneable, said method comprising the steps of

emitting a light beam by a gain medium to the external cavity;

applying an alternating voltage of amplitude V_{TM} to the light transmissive material of the tuneable mirror at a frequency f_A thereby selecting a resonance wavelength λ_{TM} of the resonance structure and thereby modulating in amplitude the light beam reflected or transmitted by the tuneable mirror, and

aligning the resonance wavelength λ_{TM} of the tuneable mirror to at least one of the cavity modes by analysing the modulated component of the light beam reflected or transmitted by the tuneable mirror.

2. A method as in claim 1, wherein the step of aligning the resonance wavelength is carried out by changing the amplitude V_{TM} of the voltage applied to the tuneable mirror so as to minimise the amplitude of the modulated component of the light beam either reflected by the tuneable mirror or transmitted through the tuneable mirror.

3. A method as in claim 2, wherein the amplitude modulation of the light beam reflected by or transmitted through the tuneable mirror is controlled to be not larger than ±2%.

4. A method as in claim 3, wherein the amplitude modulation of the light beam reflected by or transmitted through the tuneable mirror is controlled to be not larger than ±1%.

5. A method as in claim 1, wherein the analysed modulated component is at frequency f_A.

6. A method as in claim 1, wherein the analysed modulated component is at frequency $2f_A$.

7. A method as in claim 1, wherein selecting by mean of the tuneable mirror includes introducing a filtering element between the gain medium and the tuneable mirror, said spectrally selective loss element defining at least a pass band comprising the at least one of the cavity modes.

8. A method as in claim 7, wherein the spectrally selective loss element is a grid element defining a plurality of pass bands substantially aligned with corresponding channels of a wavelength grid.

9. A method as in claims 7 or 8, further comprising the step of aligning a pass band of the spectrally selective loss element to the at least one of the cavity modes by adjusting the injection current of the gain medium so as to maximise the laser output power.

10. A method as in claim 9, wherein the step of aligning a pass band of the spectrally selective loss element to the at least one of the cavity modes and the step of aligning the resonance wavelength λ_{TM} of the tuneable mirror to the at least one of the cavity modes are carried out sequentially.

11. A tuneable laser module configured to emit output radiation on a single longitudinal mode at a laser emission wavelength, the laser module comprising
an external cavity defining a plurality of cavity modes;
a gain medium to emit a light beam into the external cavity;
a tuneable mirror comprising a diffraction grating and a planar waveguide optically interacting with said diffraction grating, the diffraction grating and the planar waveguide forming a resonant structure, the tuneable mirror further comprising a light transmissive material having an index of refraction that varies in response to an electric field applied to the light transmissive material, making the tuneable mirror electrically tuneable in response to an alternating voltage of amplitude V_{TM} and frequency f_A, so as to select a

resonance wavelength λ_{TM} and so as to modulate in amplitude the light beam reflected or transmitted by the tuneable mirror, and

a controlling device apt to align the resonance wavelength λ_{TM} of the tuneable mirror to at least one of the cavity modes by analysing the modulated component of the light beam reflected or transmitted by the tuneable mirror.

12. A tuneable laser module according to claim 11, wherein the controlling device carries out the function of analysing the modulated component of the light beam either reflected by the tuneable mirror or transmitted through the tuneable mirror by changing the amplitude V_{TM} of the voltage applied to the tuneable mirror so as to minimise the amplitude of the modulated component of the light beam.

13. A tuneable laser module according to claim 11, wherein the controlling device is included in an electronic circuit card.